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MODELING FOREST STRUCTURAL DIVERSITY MEASURES USING AIRBORNE LASER SCANNING AND HYPERSPECTRAL DATA

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ABSTRACT:

The knowledge about forest diversity is important to formulate and support many management regimes and decisions. A sound description of forest diversity is becoming a key figure in forest management planning and ecological, biodiversity, and silviculture applications. The use of remote sensing data for forest monitoring has become a widely used methodology, and airborne laser scanning (ALS) and hyperspectral data are increasingly applied in this field. Moreover, it has been shown that remote sensing data fusion can be very useful in forestry applications. In this study, we tested these remote sensing sensors, both alone and combined, to model and predict forest structural diversity. The study area is located in the Italian Alps and it was scanned with airborne laser scanning and hyperspectral sensors. In the field, 47 sample plots were placed with the radius of 15 m. Among all the plots, 17 different tree species were recorded. The dominant species was Norway spruce (*Picea abies (L.) H. Karst*). The forest structural diversity measures explored were Shannon-Wiener index, Simpson's index, species richness, Gini coefficient of basal area, standard deviation of diameter at breast height, and diameter differentiation index. All these measures described tree species, size, and position diversity.